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10/596,359	06/09/2006	Hajime Kando	36856.1450	5636

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EXAMINER	
ROSENAU, DEREK JOHN	

ART UNIT	PAPER NUMBER
2834	

NOTIFICATION DATE	DELIVERY MODE
03/26/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/596,359	KANDO, HAJIME	
	Examiner	Art Unit	
	Derek J. Rosenau	2834	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 February 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *23-28,30,31 and 33-57* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *23-28,30,31 and 33-57* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Specification

1. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 23-28, 30, 31, and 33-57 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

4. With respect to claims 31 and 34, the language "properties of the boundary acoustic wave device are not changed by changes in surface conditions of the single crystal substrate and the solid layer" is unclear as it is not clear what properties are not changed, and it is unclear what conditions are changed.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 23-28, 31, 33, 35-38, and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Itakura et al. (US 2002/0158549) in view of Taniguchi (US 2001/0008387), Takayama et al. (US 20040174233), and Nishiyama et al. (US 2007/0132339)..

7. With respect to claim 31, Itakura et al. discloses a boundary acoustic wave device (Fig 1) using a non-leaky propagation type boundary acoustic wave, comprising: a boundary acoustic wave element, including a single crystal substrate (item 4), a solid layer (item 6) provided on the single crystal substrate, and electrodes (item 5) arranged at a boundary between the single crystal substrate and the solid layer (Fig 1); wherein the single crystal substrate has a cut angle (Paragraph 86); and, as best the examiner can ascertain, wherein properties of the boundary acoustic wave device are not changed by changes in surface conditions of the single crystal substrate and the solid layer.

Itakura et al. does not disclose expressly a plurality of boundary acoustic wave elements, the single crystal substrates of those elements having the same cut angle, or a propagation direction of a boundary acoustic wave of at least one of the boundary acoustic wave elements is different from that of at least one of the other boundary

acoustic wave resonators, or that the thickness of the electrodes is set so that the acoustic velocity of an SH type boundary acoustic wave is lower than the acoustic velocity of a slow transverse wave propagating through the solid layer and the acoustic velocity of a slow transverse wave propagating through the piezoelectric single crystal substrate, or that $H>8261.744\rho^{-1.376}$, when ρ represents the density of the electrodes, H represents the thickness of the electrodes, and λ represents the wavelength of a boundary wave, or that $\rho>3745$ kg/m^3.

Taniguchi teaches a boundary acoustic wave device having a plurality of boundary acoustic wave elements (Fig 5), the single crystal substrates of those elements having the same cut angle (Paragraph 49), and a propagation direction of a boundary acoustic wave of at least one of the boundary acoustic wave elements is different from that of at least one of the other boundary acoustic wave resonators (Fig 5). Taniguchi also discloses that $H>8261.744\rho^{-1.376}$, when ρ represents the density of the electrodes, H represents the thickness of the electrodes, and λ represents the wavelength of a boundary wave. The claim language does not define the wavelength or how to determine it; therefore, the wavelength can be any desired value. Therefore, the electrode thickness would meet the condition $H>8261.744\rho^{-1.376}$ for some value of λ.

Takayama et al. teaches a boundary acoustic wave device in which the thickness of the electrodes is set so that the acoustic velocity of an SH type boundary acoustic wave is lower than the acoustic velocity of a slow transverse wave propagating through the solid layer and the acoustic velocity of a slow transverse wave propagating through the piezoelectric single crystal substrate (Paragraphs 8 and 83). Although Takayama et

al. does not disclose explicitly the functional language "so that the acoustic velocity of an SH type boundary acoustic wave is lower than the acoustic velocity of a slow transverse wave propagating through the solid layer and the acoustic velocity of a slow transverse wave propagating through the piezoelectric single crystal substrate," this would be inherent as Takayama et al. discloses the electrode thicknesses disclosed in the specification.

Nishiyama et al. teaches a boundary acoustic wave device in which the electrode may be made of a large number of materials, among them materials having densities greater than 3745 Kg/m^3 (Paragraph 32).

With respect to the language "properties of the boundary acoustic wave device are not changed by changes in surface conditions of the single crystal substrate and the solid layer", this is merely language describing a characteristic of the device that does not, by itself, provide any additional structure to the device. Therefore, as the combination of Itakura et al., Taniguchi, and Takayama et al. discloses each of the claimed structural features, the structure resulting from the combination would possess the same characteristics.

At the time of invention, it would have been obvious to a person of ordinary skill in the art to combine the plurality of boundary acoustic wave elements having different propagation directions of Taniguchi, the electrode thickness of Takayama et al., and the electrode materials of Nishiyama et al. with the boundary acoustic wave device of Itakura et al. for the benefit of allowing for different electromechanical coupling coefficients within the same device (Paragraph 58 of Taniguchi) and of reducing the

propagation loss (Paragraph 8 of Takayama et al.), and as the electrode materials taught by Nishiyama are well known for their use as electrode materials.

8. With respect to claim 23, the combination of Itakura et al., Taniguchi, Takayama et al., and Nishiyama et al. discloses the boundary acoustic wave device according to claim 31. Taniguchi discloses that the plurality of boundary acoustic wave elements are boundary acoustic wave filters or boundary acoustic wave resonators (Paragraph 58).

9. With respect to claim 24, the combination of Itakura et al., Taniguchi, Takayama et al., and Nishiyama et al. discloses the boundary acoustic wave device according to claim 31. Taniguchi discloses that the plurality of boundary acoustic wave elements define resonators (Paragraph 58).

10. With respect to claim 25, the combination of Itakura et al., Taniguchi, Takayama et al., and Nishiyama et al. discloses the boundary acoustic wave device according to claim 31. Taniguchi discloses that the boundary acoustic wave device is a longitudinally coupled filter (Fig 5).

11. With respect to claim 26, the combination of Itakura et al., Taniguchi, Takayama et al., and Nishiyama et al. discloses the boundary acoustic wave device according to claim 31. Taniguchi discloses that the boundary acoustic wave elements are provided on a single piezoelectric single crystal substrate (Paragraph 58).

12. With respect to claim 27, the combination of Itakura et al., Taniguchi, Takayama et al., and Nishiyama et al. discloses the boundary acoustic wave device according to claim 31. Taniguchi discloses that an electromechanical coefficient of at least one of the

boundary acoustic wave elements is different from that of at least one of the other boundary acoustic wave elements (Paragraph 58).

13. With respect to claim 28, the combination of Itakura et al., Taniguchi, Takayama et al., and Nishiyama et al. discloses the boundary acoustic wave device according to claim 31. Taniguchi discloses that a band width of at least one of the boundary acoustic wave elements is different from that of at least one of the other boundary acoustic wave elements (Paragraph 55).

14. With respect to claim 33, the combination of Itakura et al., Taniguchi, Takayama et al., and Nishiyama et al. discloses the boundary acoustic wave device according to claim 31. Taniguchi discloses that $33000.39050\rho^{-1.50232}<H<88818\rho^{-1.54998}$. The claim language does not define the wavelength or how to determine it; therefore, the wavelength can be any desired value. Therefore, the electrode thickness would meet the condition $33000.39050\rho^{-1.50232}<H<88818\rho^{-1.}54998$ for some value of λ.

15. With respect to claim 35, the combination of Itakura et al., Taniguchi, Takayama et al., and Nishiyama et al. discloses the boundary acoustic wave device according to claim 31. Taniguchi discloses that the electrodes each include a main electrode layer made from a material selected from the group consisting of Au, Ag, Cu, Al, Fe, Ni, W, Ta, Pt, Mo, Cr, Ti, ZnO, and ITO (Paragraph 61).

With respect to claim 36, the combination of Itakura et al., Taniguchi, Takayama et al., and Nishiyama et al. discloses the boundary acoustic wave device according to claim 35. Nishiyama et al. discloses that the electrodes each include an additional electrode layer (Fig 1F and 1G, item 5) laminated on the main electrode layer (item 4A).

16. With respect to claim 37, the combination of Itakura et al., Taniguchi, Takayama et al., and Nishiyama et al. discloses the boundary acoustic wave device according to claim 36. Itakura discloses that the solid layer includes a dielectric substance (Paragraph 97).

17. With respect to claim 38, the combination of Itakura et al., Taniguchi, Takayama et al., and Nishiyama et al. discloses the boundary acoustic wave device according to claim 37. Itakura et al. discloses that the dielectric substance includes a material primarily composed of SiO_2 (Paragraph 97).

18. With respect to claim 41, the combination of Itakura et al., Taniguchi, Takayama et al., and Nishiyama et al. discloses the boundary acoustic wave device according to claim 37. Itakura et al. discloses that the solid layer includes at least one material selected from the group consisting of Si, SiO_2, glass, silicon nitride, silicon carbide, ZnO, Ta_2O_5, titanate zirconate lead piezoelectric ceramic, aluminum nitride, Al_2O_3, $LiTaO_3$, and $LiNbO_3$ (Paragraph 97).

19. Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Itakura et al. in view of Taniguchi, Takayama et al., Nishiyama et al., and Takamine (US 20020135267).

20. With respect to claim 30, the combination of Itakura et al., Taniguchi, Takayama et al., and Nishiyama et al. discloses the boundary acoustic wave device according to claim 31.

None of Itakura et al., Taniguchi, Takayama et al., or Nishiyama et al. discloses expressly that a duty ratio of the electrodes is set so that the acoustic velocity of an SH

type boundary acoustic wave is lower than the acoustic velocity of a slow transverse wave propagating through the solid layer and the acoustic velocity of a slow transverse layer propagating through the piezoelectric single crystal substrate.

Takamine teaches a boundary acoustic wave device in which a duty ratio of the electrodes is set so that the acoustic velocity of an SH type boundary acoustic wave is lower than the acoustic velocity of a slow transverse wave propagating through the solid layer and the acoustic velocity of a slow transverse layer propagating through the piezoelectric single crystal substrate (Paragraph 64 and Table 1). Although Takamine does not disclose explicitly the functional language "so that the acoustic velocity of an SH type boundary acoustic wave is lower than the acoustic velocity of a slow transverse wave propagating through the solid layer and the acoustic velocity of a slow transverse layer propagating through the piezoelectric single crystal substrate," this would be inherent as Takamine discloses the IDT duty ratios disclosed in the specification.

At the time of invention, it would have been obvious to a person of ordinary skill in the art to combine the IDT duty ratio of Takamine with the boundary acoustic wave device of Itakura et al. as modified by Taniguchi and Takayama et al. as it has been held that optimization of a device, where the general conditions are met by the prior art, would be obvious to a person of ordinary skill in the art (*In re Aller*, 105 USPQ 233).

21. Claims 34, 43-48, and 50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Itakura et al. in view of Taniguchi, Takayama et al., and Nakahata (US 6025636).

22. With respect to claim 34, Itakura et al. discloses a boundary acoustic wave device (Fig 1) using a non-leaky propagation type boundary acoustic wave, comprising: a boundary acoustic wave element, including a single crystal substrate (item 4), a solid layer (item 6) provided on the single crystal substrate, and electrodes (item 5) arranged at a boundary between the single crystal substrate and the solid layer (Fig 1); wherein the single crystal substrate has a cut angle (Paragraph 86); and, as best the examiner can ascertain, wherein properties of the boundary acoustic wave device are not changed by changes in surface conditions of the single crystal substrate and the solid layer.

Itakura et al. does not disclose expressly a plurality of boundary acoustic wave elements, the single crystal substrates of those elements having the same cut angle, or a propagation direction of a boundary acoustic wave of at least one of the boundary acoustic wave elements is different from that of at least one of the other boundary acoustic wave resonators, or that the thickness of the electrodes is set so that the acoustic velocity of an SH type boundary acoustic wave is lower than the acoustic velocity of a slow transverse wave propagating through the solid layer and the acoustic velocity of a slow transverse wave propagating through the piezoelectric single crystal substrate, or that that the piezoelectric single crystal substrate is $LiNbO_3$ substrate, φ of Euler angles (φ,θ,ψ) of the $LiNbO_3$ substrate is in the range -31° to 31°, and θ and ψ are in the range surrounded by the points A1 to A13 shown in table 1.

Points	Ψ(°)	Θ(°)
A01	0	116

A02	11	118
A03	20	123
A04	25	127
A05	33	140
A06	60	140
A07	65	132
A08	54	112
A09	48	90
A10	43	87
A11	24	90
A12	0	91
A13	0	118

Taniguchi teaches a boundary acoustic wave device having a plurality of boundary acoustic wave elements (Fig 5), the single crystal substrates of those elements having the same cut angle (Paragraph 49), and a propagation direction of a boundary acoustic wave of at least one of the boundary acoustic wave elements is different from that of at least one of the other boundary acoustic wave resonators (Fig 5).

Takayama et al. teaches a boundary acoustic wave device in which the thickness of the electrodes is set so that the acoustic velocity of an SH type boundary acoustic wave is lower than the acoustic velocity of a slow transverse wave propagating through

the solid layer and the acoustic velocity of a slow transverse wave propagating through the piezoelectric single crystal substrate (Paragraphs 8 and 83). Although Takayama et al. does not disclose explicitly the functional language "so that the acoustic velocity of an SH type boundary acoustic wave is lower than the acoustic velocity of a slow transverse wave propagating through the solid layer and the acoustic velocity of a slow transverse wave propagating through the piezoelectric single crystal substrate," this would be inherent as Takayama et al. discloses the electrode thicknesses disclosed in the specification.

Nakahata teaches a boundary acoustic wave device in which the piezoelectric single crystal substrate is $LiNbO_3$ substrate, φ of Euler angles (φ,θ,ψ) of the $LiNbO_3$ substrate is in the range -31° to 31°, and θ and ψ are in the range surrounded by the points A1 to A13 (column 9, line 65 through column 10, line 18).

With respect to the language “properties of the boundary acoustic wave device are not changed by changes in surface conditions of the single crystal substrate and the solid layer”, this is merely language describing a characteristic of the device that does not, by itself, provide any additional structure to the device. Therefore, as the combination of Itakura et al., Taniguchi, Takayama et al., and Nakahata et al. discloses each of the claimed structural features, the structure resulting from the combination would possess the same characteristics.

At the time of invention, it would have been obvious to a person of ordinary skill in the art to combine the plurality of boundary acoustic wave elements having different propagation directions of Taniguchi, the electrode thickness of Takayama et al., and the

crystal orientation of Nakahata with the boundary acoustic wave device of Itakura et al. for the benefits of allowing for different electromechanical coupling coefficients within the same device (Paragraph 58 of Taniguchi), reducing the propagation loss (Paragraph 8 of Takayama et al.), and improving the coupling coefficient (column 2, lines 29-42 of Nakahata).

23. With respect to claims 43-48 and 50, the subject matter thereof corresponds to that of claims 23-28 and 35; therefore, claims 43-48 and 50 are unpatentable over Itakura in view of Taniguchi, Takayama et al., and Nakahata.

24. Claims 39 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Itakura et al. in view of Taniguchi, Takayama et al., Nishiyama, and Mishima et al. (US 20050099091).

25. With respect to claim 39, the combination of Itakura et al., Taniguchi, Takayama et al., and Nishiyama et al. discloses the boundary acoustic wave device according to claim 37.

None of Itakura et al., Taniguchi, Takayama et al., or Nishiyama et al. discloses that the solid layer includes a plurality of laminates, each of the plurality of laminates including a plurality of material layers.

Mishima et al. teaches a boundary acoustic wave device in which the solid layer includes a plurality of laminates, each of the plurality of laminates including a plurality of material layers (Fig 10, items 15 and 16).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to combine the laminates solid layer of Mishima et al. with the boundary

acoustic wave device of Itakura et al. as modified by Taniguchi, Takayama et al., and Nishiyama et al. for the benefit of preventing thermal damage during the manufacturing process (Paragraph 72 of Mishima et al.).

26. With respect to claim 40, the combination of Itakura et al., Taniguchi, Takayama et al., Nishiyama et al., and Mishima et al. discloses the boundary acoustic wave device according to claim 39. Mishima et al. discloses that the solid layer includes a layer primarily composed of SiO_2 (item 15) laminated to a layer primarily composed of Si (item 16).

27. Claim 42 is rejected under 35 U.S.C. 103(a) as being unpatentable over Itakura et al. in view of Taniguchi, Takayama et al., Nishiyama et al., and Kadota et al. (US 5260913).

28. With respect to claim 42, the combination of Itakura et al., Taniguchi, Takayama et al., and Nishiyama et al. discloses the boundary acoustic wave device according to claim 31.

None of Itakura et al., Taniguchi, Takayama et al., or Nishiyama et al. discloses expressly that the boundary acoustic wave elements each further includes a resin layer adhered to the solid layer.

Kadota et al. teaches a boundary acoustic wave device in which the boundary acoustic wave elements includes a resin layer (Fig 9, item 29) adhered to a solid layer (item 5).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to combine the resin layer of Kadota et al. with the boundary acoustic wave

device of Itakura et al. as modified by Taniguchi and Takayama et al. for the benefit of simplifying the manufacturing process of the device (column 6, lines 59-68 of Kadota et al.) and better protecting the device by placing the device in a packaging material.

29. Claim 49 is rejected under 35 U.S.C. 103(a) as being unpatentable over Itakura et al. in view of Taniguchi, Takayama et al., Nakahata, and Takamine.

30. With respect to claim 49, the subject matter thereof corresponds to that of claim 30; therefore, claim 49 is unpatentable over Itakura in view of Taniguchi, Takayama et al., Nakahata, and Takamine.

31. Claims 51-53 and 56 are rejected under 35 U.S.C. 103(a) as being unpatentable over Itakura et al. in view of Taniguchi, Takayama et al., Nakahata, and Nishiyama et al.

32. With respect to claims 51-53 and 56, the subject matter thereof corresponds to that of claims 36-38 and 41; therefore, claims 51-53 and 56 are unpatentable over Itakura et al. in view of Taniguchi, Takayama et al., Nakahata, and Nishiyama et al.

33. Claims 54 and 55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Itakura et al. in view of Taniguchi, Takayama et al., Nakahata, Nishiyama, and Mishima et al.

34. With respect to claims 54 and 55, the subject matter thereof corresponds to that of claims 39 and 40; therefore, claims 54 and 55 are unpatentable over Itakura et al. in view of Taniguchi, Takayama et al., Nakahata, Nishiyama, and Mishima et al.

35. Claim 57 is rejected under 35 U.S.C. 103(a) as being unpatentable over Itakura et al. in view of Taniguchi, Takayama et al., Nakahata, and Kadota et al.

36. With respect to claim 57, the subject matter thereof corresponds to that of claim 42; therefore, claim 57 is unpatentable over Itakura et al., Taniguchi, Takayama et al., Nakahata, and Kadota.

Response to Arguments

37. Applicant's arguments filed 17 February 2009 have been fully considered but they are not persuasive.

38. Applicant argues that none of Itakura et al., Taniguchi, Takayama et al., and Nakahata et al. discloses a boundary acoustic wave device. However both, Itakura et al. and Nakahata et al. are directed to both surface acoustic wave devices and boundary acoustic wave devices.

39. Applicant argues that none of Itakura et al., Taniguchi, Takayama et al., and Nakahata et al. discloses that properties of the boundary acoustic wave device are not changed by changes in surface conditions of the single crystal substrate and the solid layer. However, clearly there is at least one property of the boundary acoustic wave device, such as density of its layers, that would remain unchanged despite changes in surface conditions of the single crystal substrate and the solid layer. In addition, this language is directly only to a characteristic of the device and does not, by itself, provide additional structure to the claimed device. Therefore, as the combination of Itakura et al., Taniguchi, Takayama et al., and Nakahata et al. disclose each of the claimed structural elements, the structure resulting from that combination would possess the same characteristics.

40. Applicant argues that figure 1 of Itakura et al. and figure 40 of Nakahata et al. do not disclose boundary acoustic wave devices. However, a boundary acoustic wave is merely a device that generates an acoustic wave along a plane along which two layers meet. In figure 1 of Itakura et al. and figure 40 of Nakahata et al., this is the case. The interdigitated electrodes of these devices are arranged to generate an acoustic wave along the surface of the piezoelectric layers upon which they are formed, and because these surfaces are formed along the bottom surfaces of subsequent layers, the acoustic waves generated by the interdigitated electrodes would propagate along the boundary between those two layers. Therefore, both Itakura et al. and Nakahata et al. disclose boundary acoustic wave devices.

41. Applicant argues that the cited paragraphs of Takayama et al. (Paragraphs 8 and 83) do not disclose "a thickness of the electrodes is set so that the acoustic velocity of an SH type boundary acoustic wave is lower than the acoustic velocity of a slow transverse wave propagating through the solid layer and the acoustic velocity of a slow transverse wave propagating through the piezoelectric single crystal substrate". However, this language is primarily functional language, with the only recited structural elements being: "a thickness of the electrode is set so that". The cited paragraphs of Takayama et al. are not to show an explicit teaching of the functional language, but to provide a teaching of the structure associated with the claimed invention. Because the proposed combination yields a device having each of the claimed structural elements, the device resulting from the combination would be capable of performing the same functions.

42. Applicant argues that Takayama et al. does not discloses an electrode density that is greater than 3745 kg/m^3. However, Takayama et al. was not relied upon for this feature. Nishiyama et al. provides the teaching of such an electrode material.

43. Applicant argues that the amended claim language provides a definition of λ that is directed to the wavelength of the device, such that the applied art does not disclose the feature $H/\lambda > 8261.744\rho^{-1.376}$. However, the claim language still does not make clear what the frequency of the device is. A boundary acoustic wave can excite an acoustic wave at any frequency with varying efficiency. Without a clear definition of which frequency “the wavelength of the device” refers to, the claim as currently written can still read on any wavelength.

44. Applicant argues that the examiner has failed to explain why one of ordinary skill in the art would desire an acoustic velocity of 8000 m/s or higher. First, with a higher acoustic velocity, the device would allow the acoustic waves to transit the length of the device in less time, allowing the device to operate faster. In addition, the previous office action recited the additional reason to combine of “for the benefit of improving coupling coefficients”.

Conclusion

45. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Derek J. Rosenau whose telephone number is (571) 272-8932. The examiner can normally be reached on Monday thru Thursday 7:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Quyen Leung can be reached on (571) 272-8188. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Quyen Leung/
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